

وسهلا

أهلا

يُمنع أخذ السلايدات بدون
إذن المحرر واي اجراء
يخالف ذلك يقع تحت
طائلة المسؤولية القانونية



الأستاذ الدكتور يوسف حسين

أستاذ التشريح وعلم الأجنة - كلية الطب - جامعة الزقازيق - مصر

رئيس قسم التشريح و الأنسجة و الأجنة - كلية الطب - جامعة مؤتة - الأردن

دكتورة من جامعة كولونيا المانيا

جروب الفيس د. يوسف حسين (استاذ التشريح)

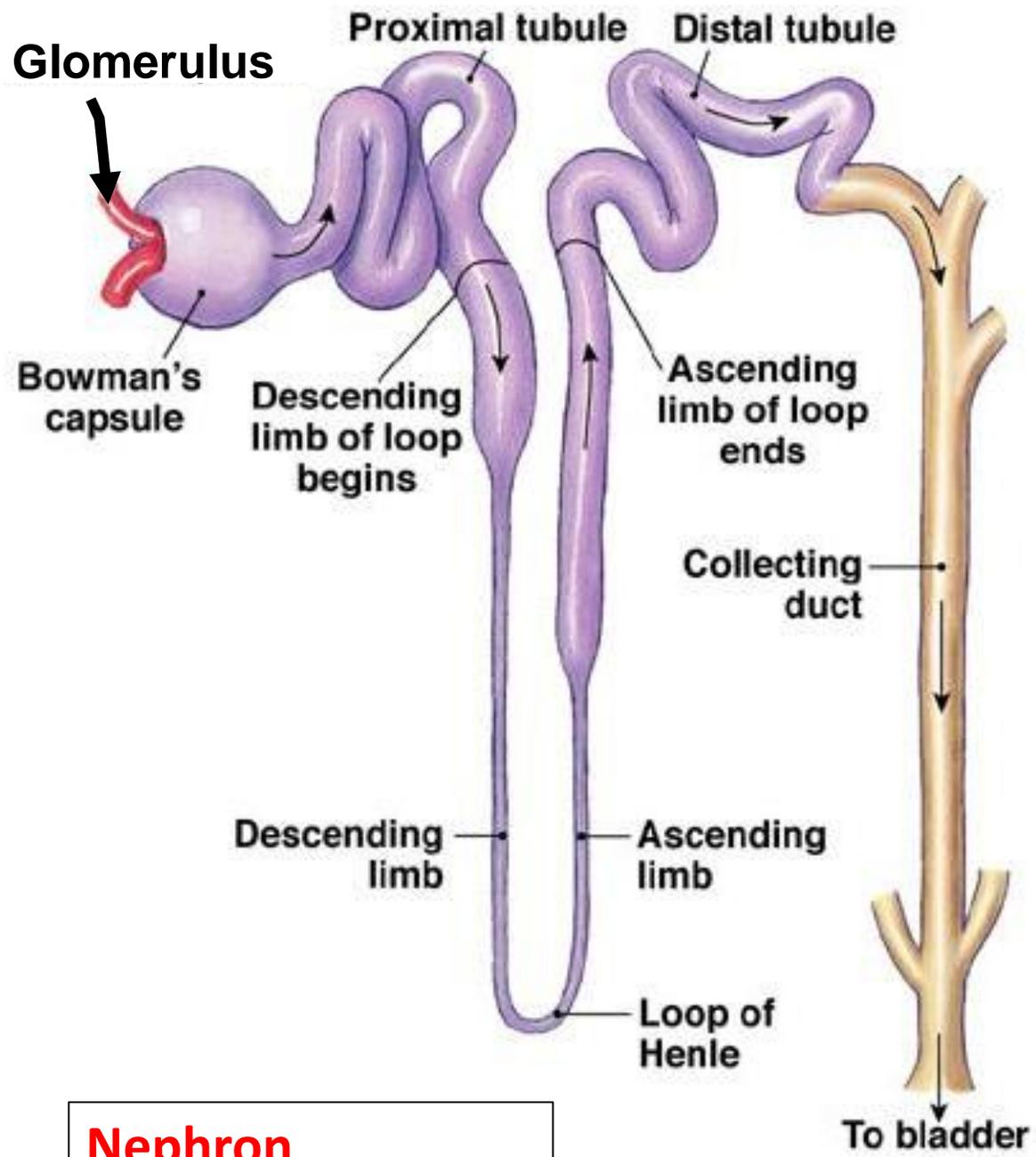
Prof. Dr. Youssef Hussein Anatomy - YouTube

اليوتيوب د. يوسف حسين

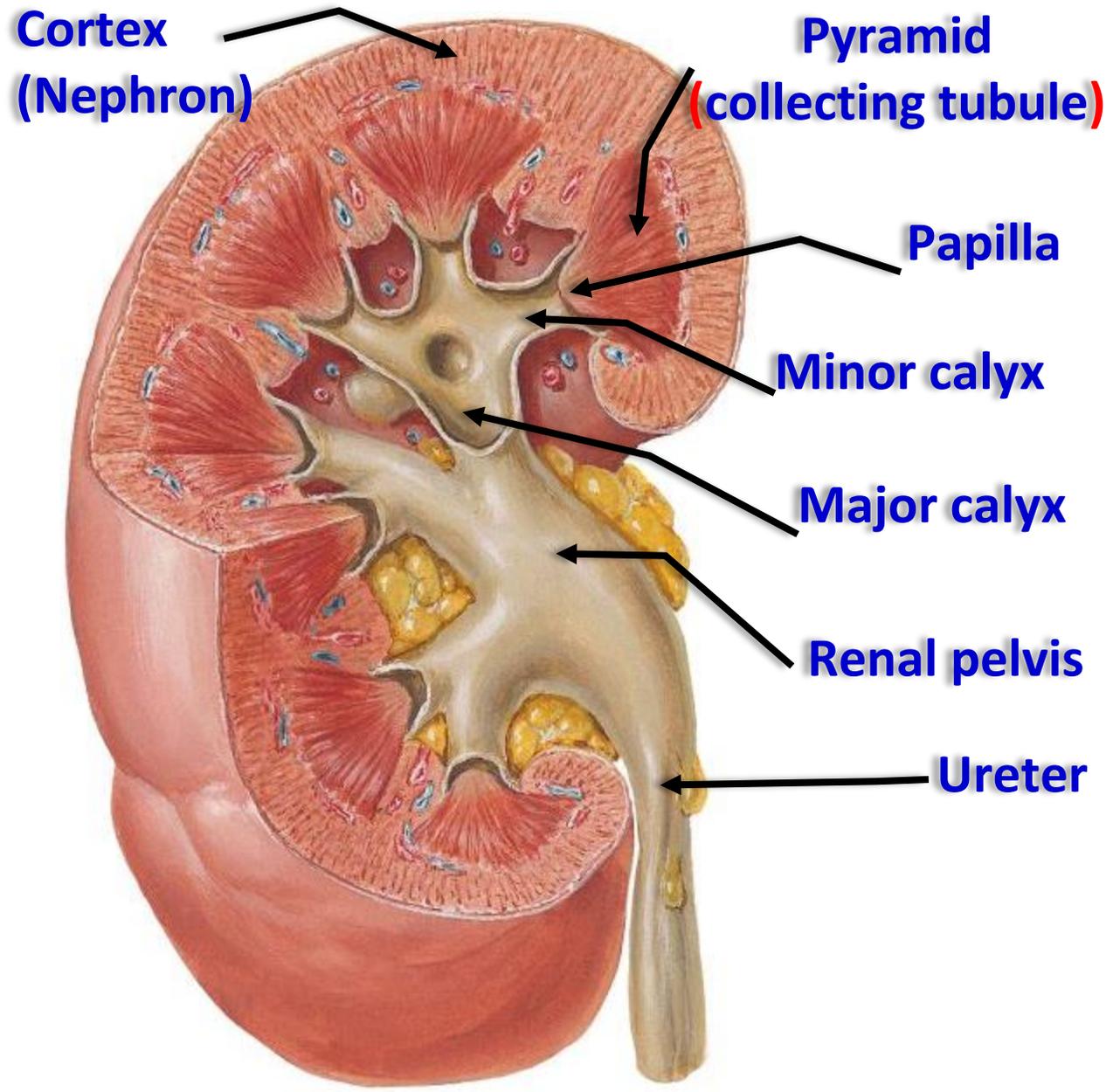
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Development of kidney and ureter

- The kidneys developed from the **intermediate mesoderm** (urogenital mesoderm).
- The kidneys pass into **3 successive stages** of development (overlap each other)

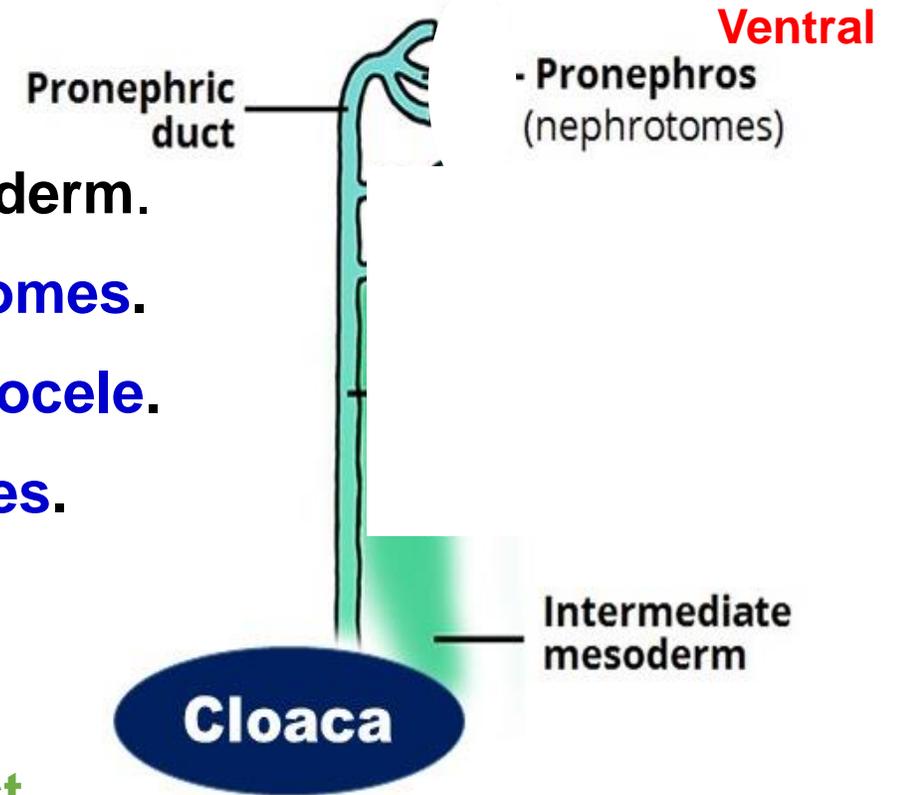


Nephron



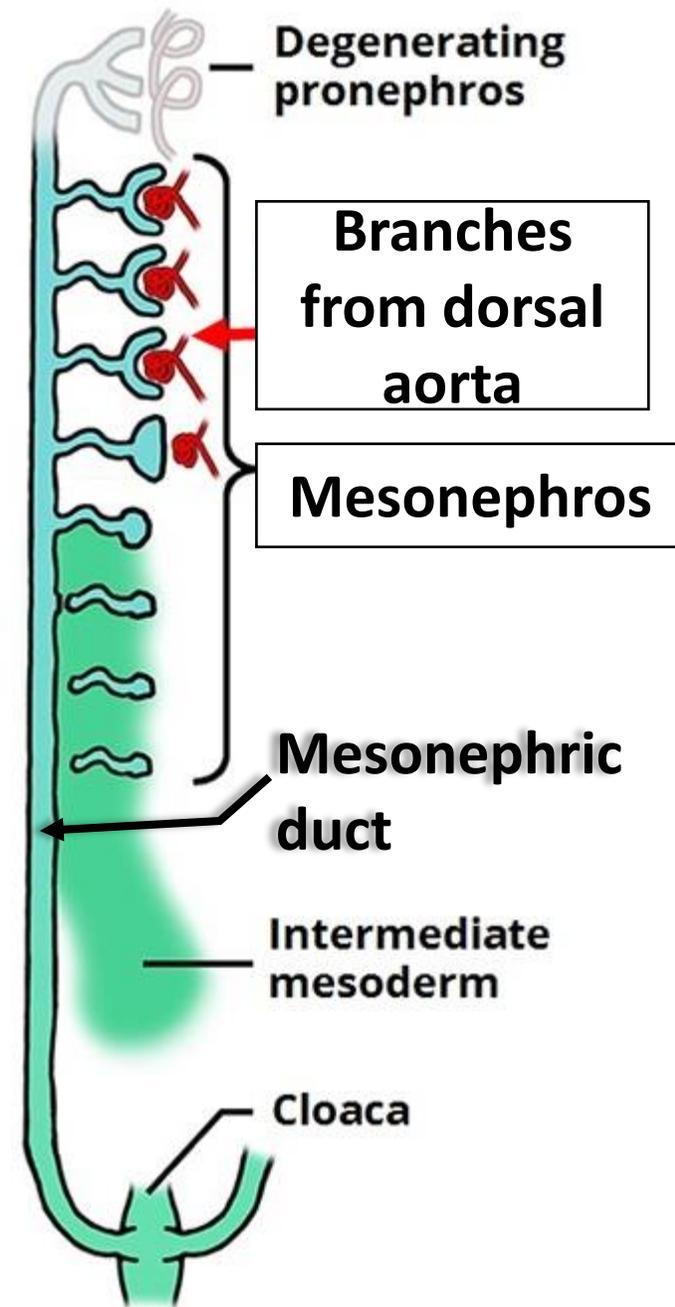
The first stage {Pronephros}

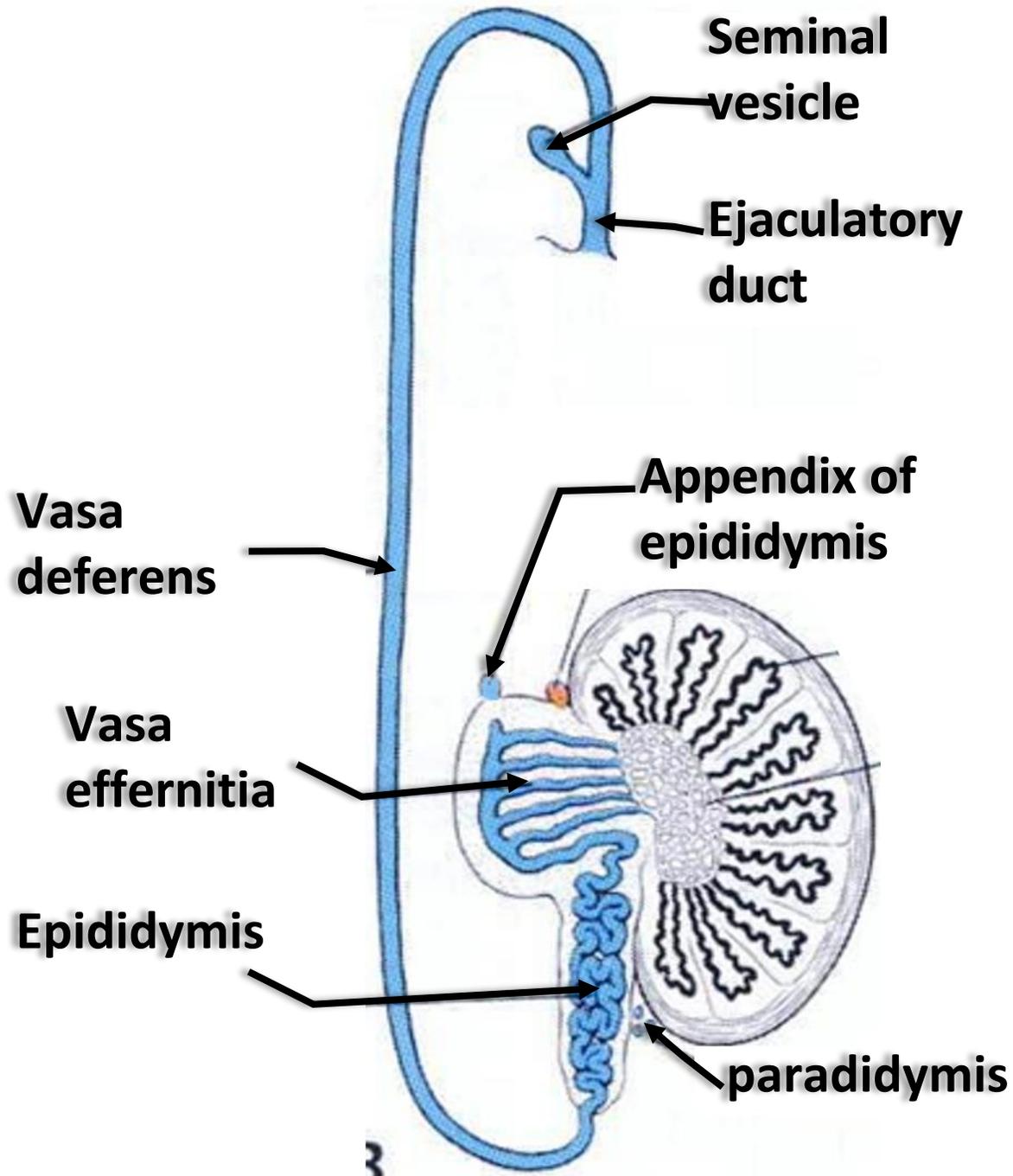
- It develops from the **cranial part** of the **intermediate mesoderm**.
 - It is divided into 7 or 8 mesodermal masses called **nephrotomes**.
 - Each nephrotome gets a small cavity changing it into **nephrocele**.
 - The nephroceles elongated and form the **pronephric tubules**.
 - Each tubule has **dorsal** and **ventral** ends.
- 1) **Ventral** ends open into the **intraembryonic coelom**.
 - 2) **Dorsal** ends join each other forming the **pronephric Duct**.
- The pronephric duct elongates caudally and opens into the **cloaca**.
 - ** **Function**, it has **no excretory** function (no glomeruli).
 - ** **Fate of pronephros**:
 - 1- The pronephric **tubules**: **disappear** completely
 - 2- The pronephric **duct**: remain to be used as a **mesonephric duct**.



- **Second stage**
- **{Mesonephros} (WOLLFIAN)**

- The middle part of the **intermediate** mesoderm becomes segmented into 70-80 masses called **nephrotomes**.
- There is a small cavity transforming it to **nephrocele**.
- Each nephrocele elongates forming **S-shape mesonephric tubule**.
- Each tubule has ventral and dorsal ends.
 - **a- Dorsal end** of each mesonephric tubule **opens into mesonephric duct**.
 - **b- Ventral end** of each tubule enlarged and invaginated by a branch from **dorsal aorta** forming a **transient glomerulus**.
- **So; the mesonephros has an excretory function.**





**** Fate (derivatives) of mesonephros**

- By the end of the **5th week** of development shows the following changes:

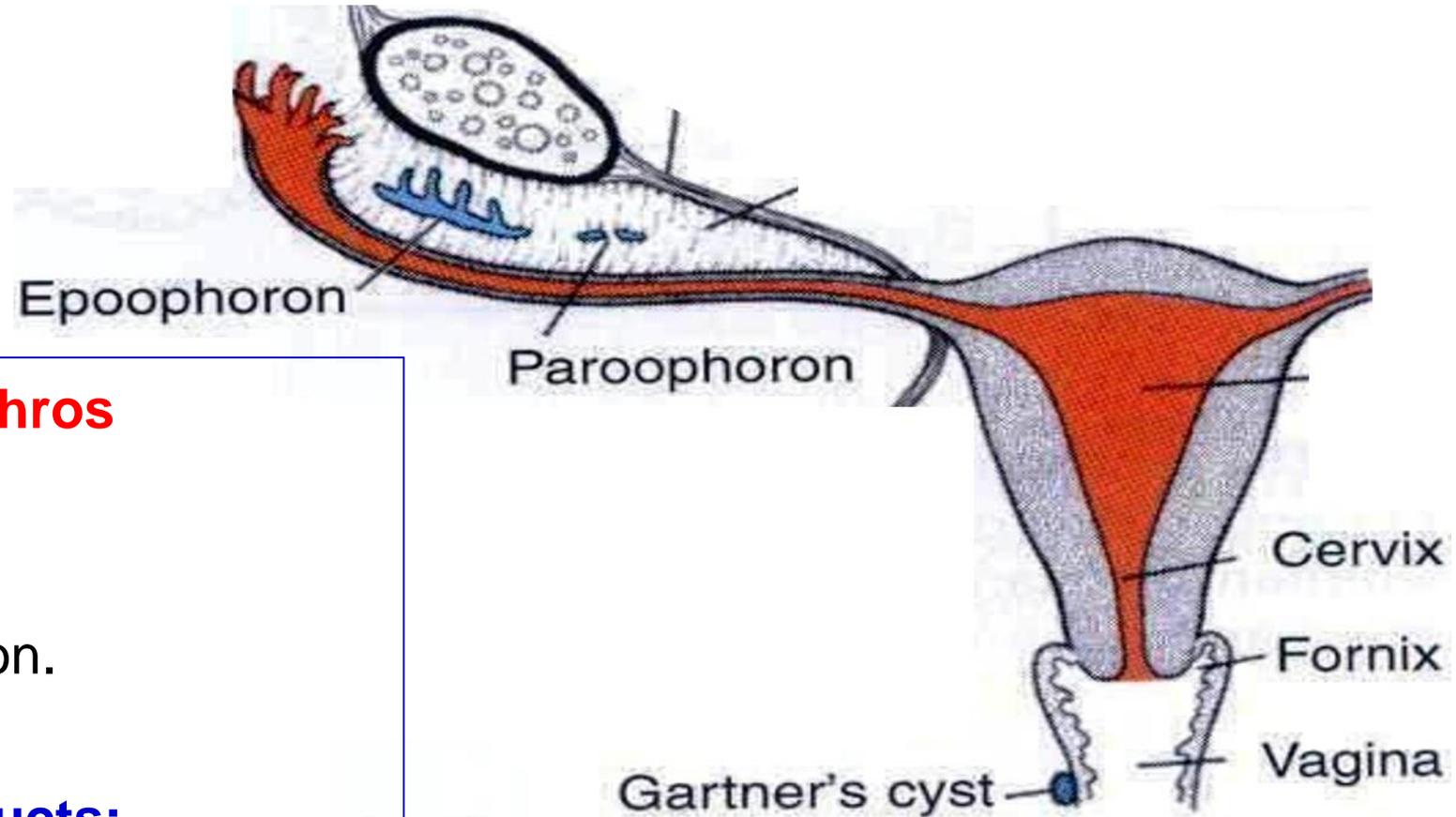
- In male embryo:

1- Mesonephric tubules:

- **Cranial part** forms appendix of Epididymis.
- **Middle part** will form vasa efferentia.
- **Caudal part** forms Paradidymis.

2- Mesonephric (Wolffian) duct:

- It forms epididymis, vas deferens, seminal vesicle and ejaculatory duct.
- Trigone of urinary bladder
- Ureteric bud



** Fate (derivatives) of mesonephros

- In female embryo:

1- The mesonephric tubules:

- **Cranial part** forms the **Epoophron**.
- **Caudal part** forms **Paroophron**.

2- The mesonephric (Wolffian) ducts:

- Gartner's cyst in the vaginal wall.
- Trigone of urinary bladder
- Ureteric bud

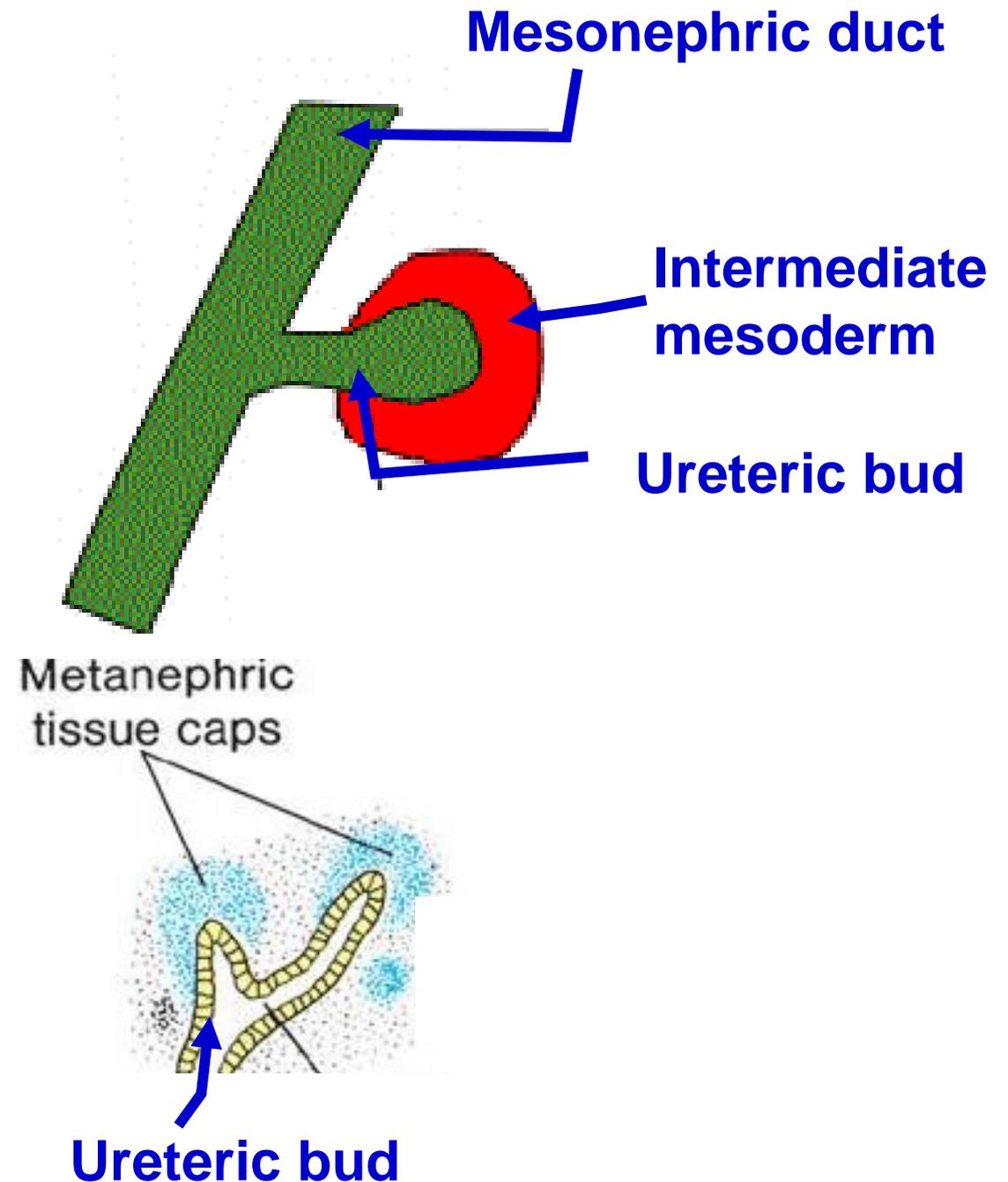
- **Third stage**

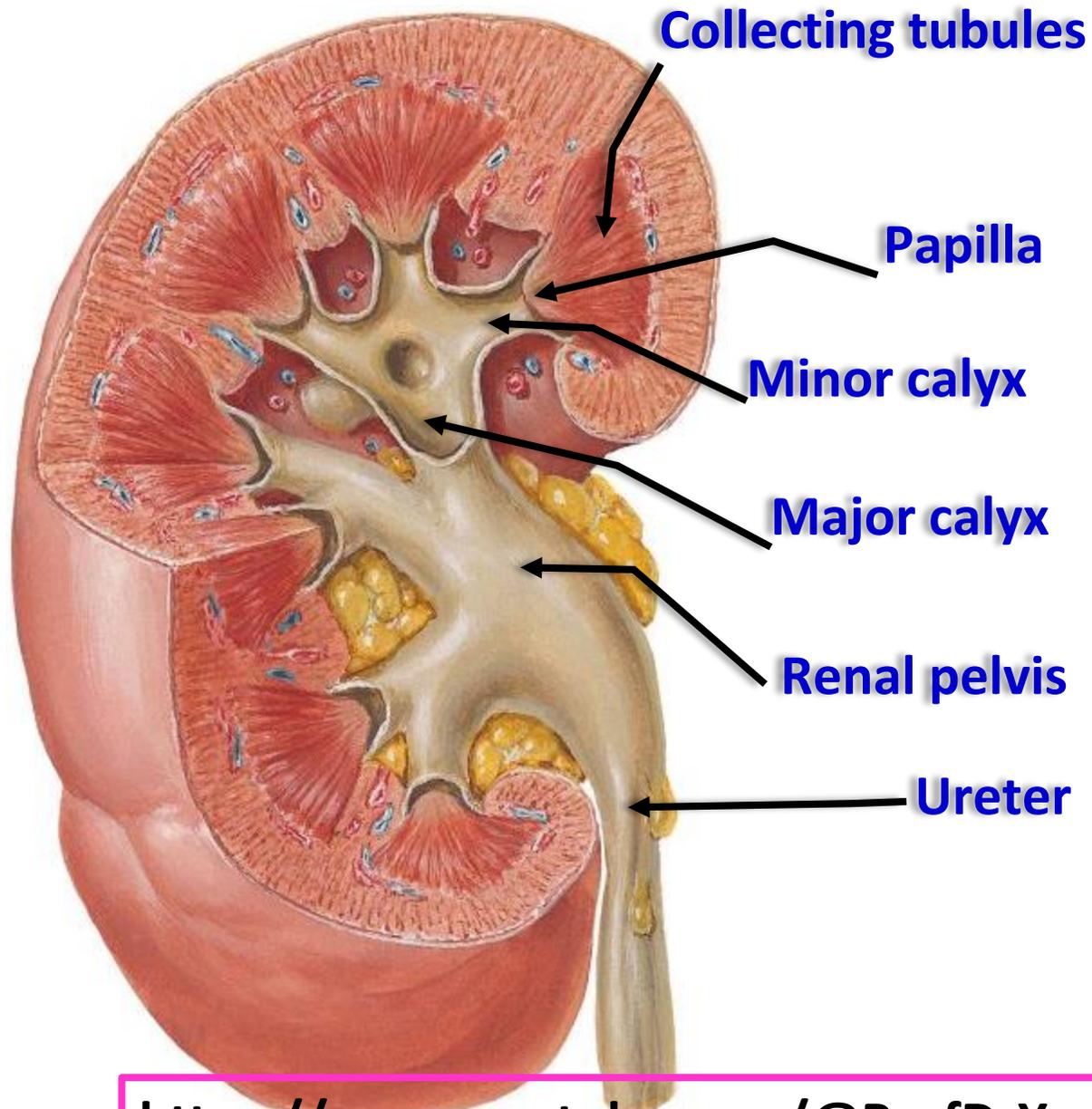
(The Metanephros, Permanent Kidney)

* Before the disappearance of mesonephros (**by the 5th week**), the metanephros starts its development:

a- Ureteric bud from mesonephric duct.

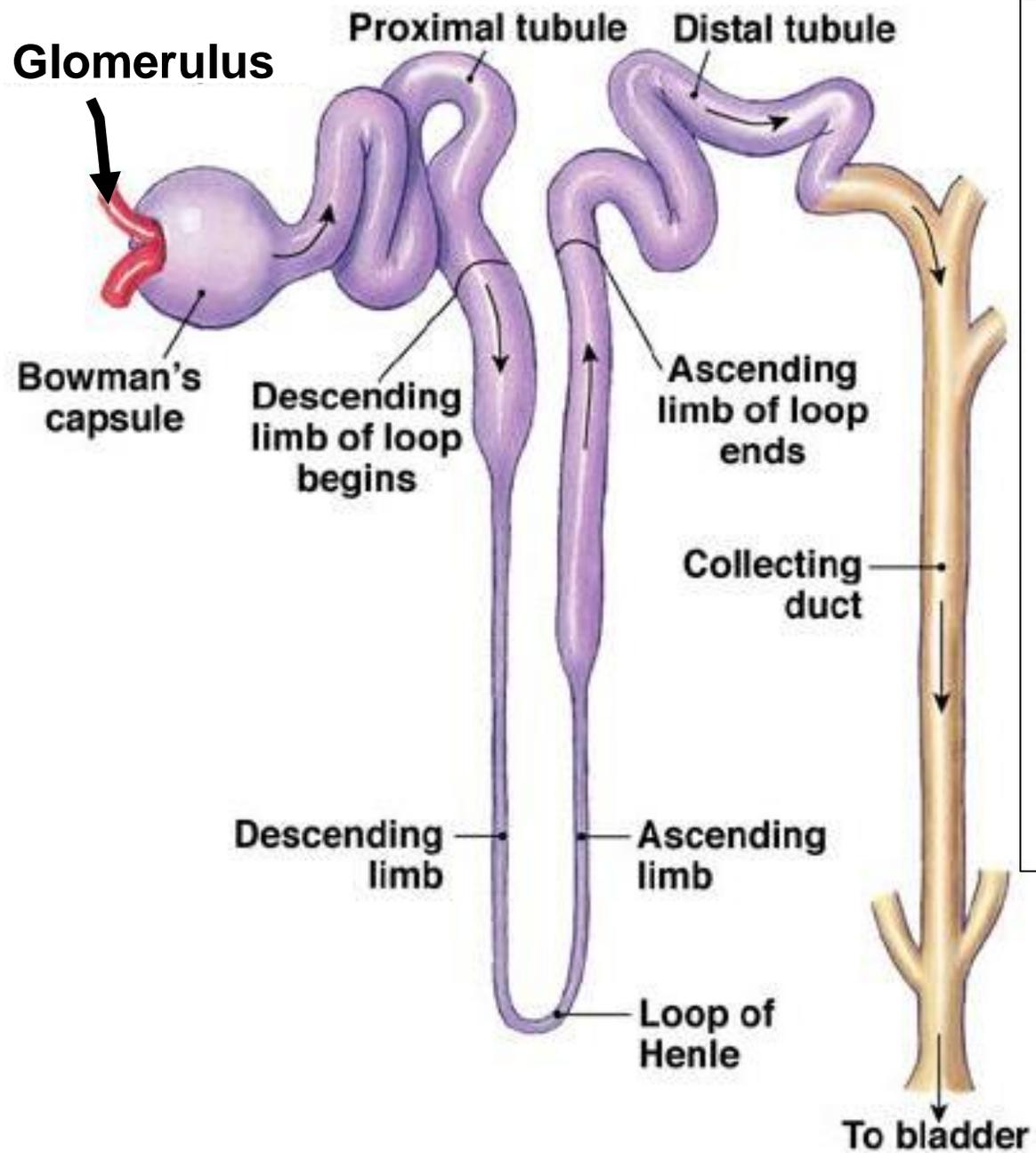
b) This bud grows upward and backward till invading caudal part of **intermediate mesoderm** that called **metanephric cap or blastema** (**opposite the lower lumbar and sacral somites**).





The ureteric bud gives
ureter--- **renal pelvis**...
major calyces----- **minor**
calyces ----- **papillae** -----
- **collecting tubules**

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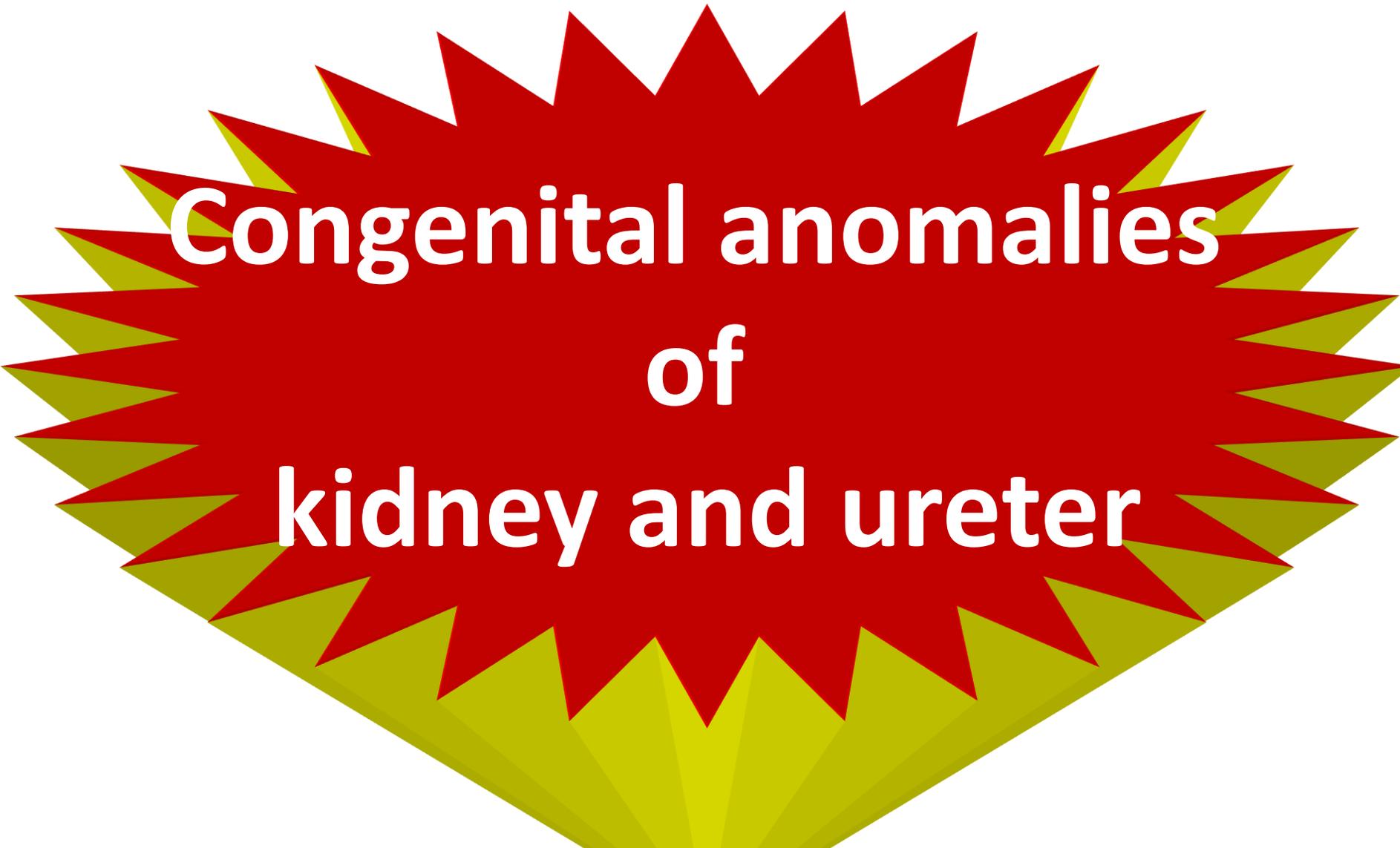
- Changes in the metanephric cap (**blastema**)

- * **Dorsal end** lies in contact with **collecting tubule** but **without** canalization.
- * **Ventral end** invaginated by branch from **internal iliac artery** forming glomerulus and Bowman's capsule.
- This tubule will elongate forming **proximal convoluted tubules**, **loop of Henle** and **distal convoluted tubule**.
- Later on **distal convoluted tubule will be canalized** with the collecting tubule.

Post-developmental changes of the kidneys

1. **Change in surface**; disappear of the fetal lobulation by the capsule.
 2. **Change in position**; ascend upward to the lumbar region.
 3. **Medial rotation 90 degree**, Hilum becomes medially after rotation.
 4. **Change in blood supply**;
 - a) In the **pelvis**, it is supplied from the **internal iliac artery**.
 - b) During its ascent, it is supplied by the **common iliac artery**.
 - c) At its normal position, it is supplied by the **abdominal aorta**.
- **Definitive nephrons secret urine in the 2nd half of pregnancy.**

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Congenital anomalies of kidney and ureter

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❖ Agenesis

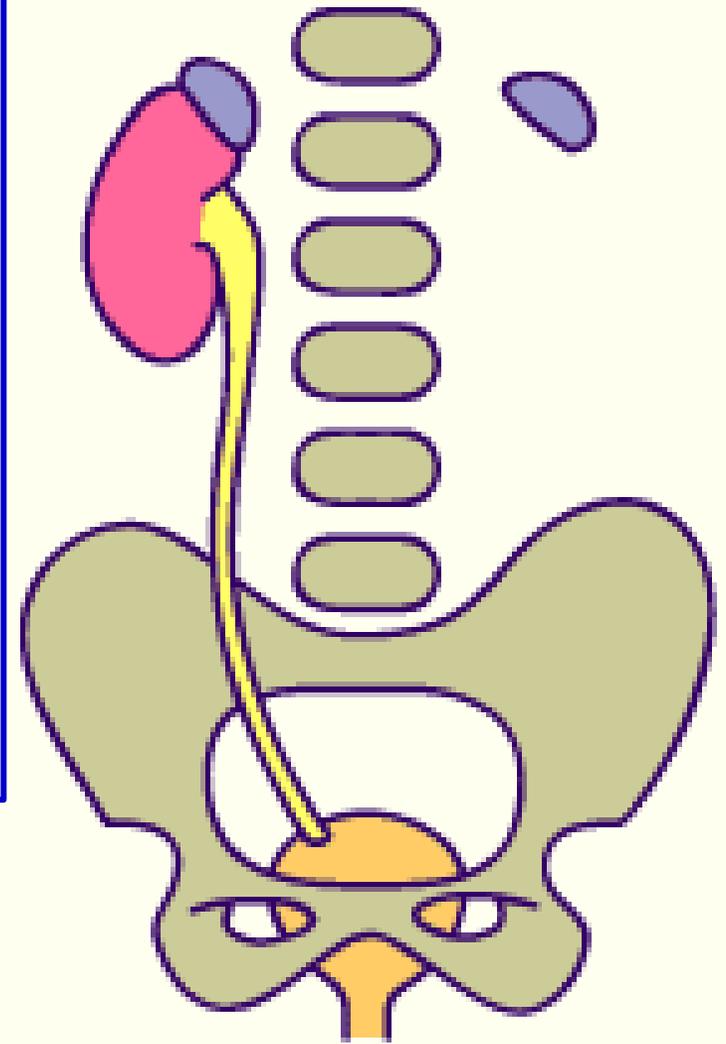
- Causes:

- 1- Failure of development of the **ureteric bud** (no ureter and kidney).
- 2- **Failure of contact** of the ureteric bud and intermediate mesoderm (ureter and no kidney).

- It may be

- **Unilateral agenesis**, It may be not noticed until problems occur in the solitary kidney.

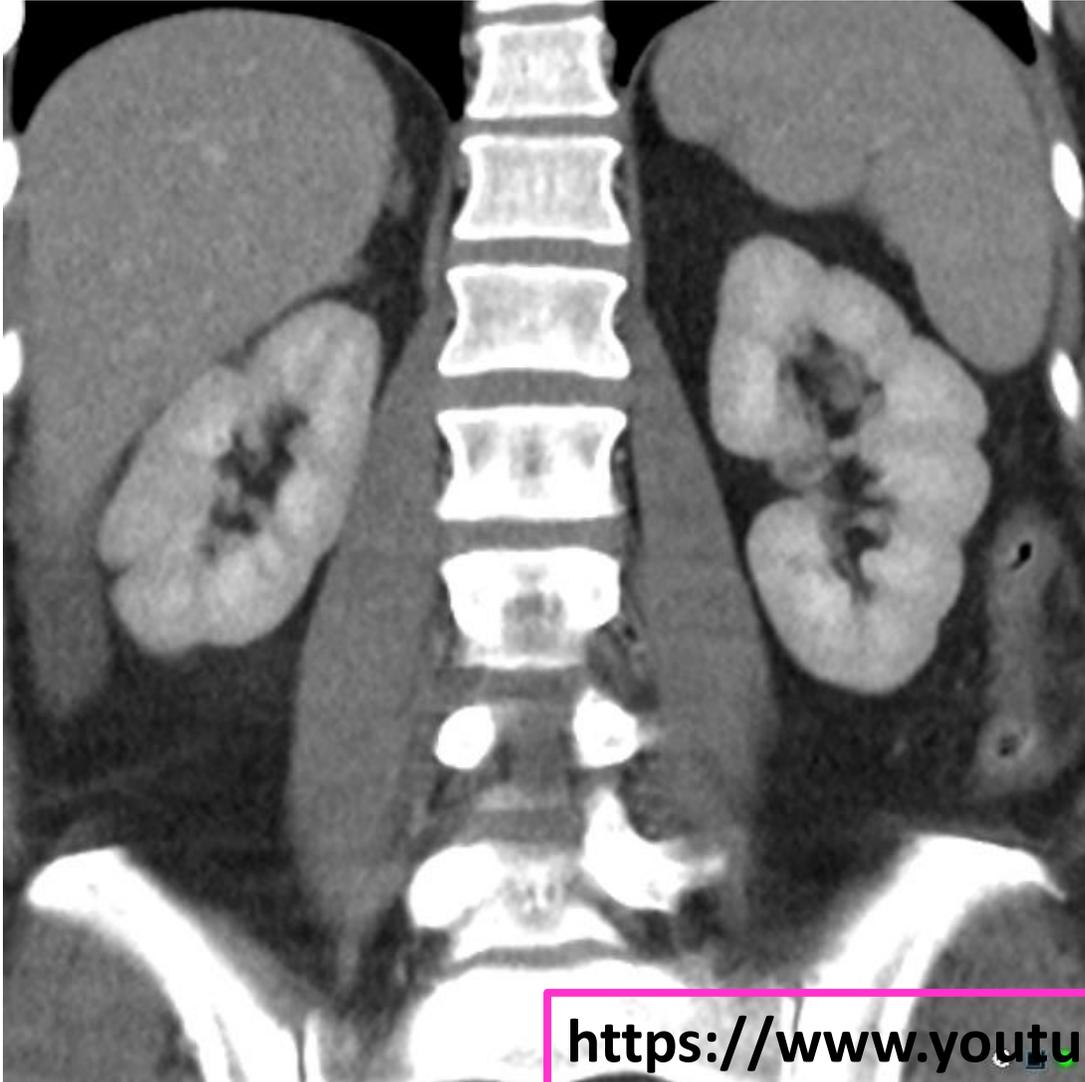
- **Bilateral agenesis** the amount of amniotic fluid decreased (oligohydramnios) and the fetus die within few days after birth



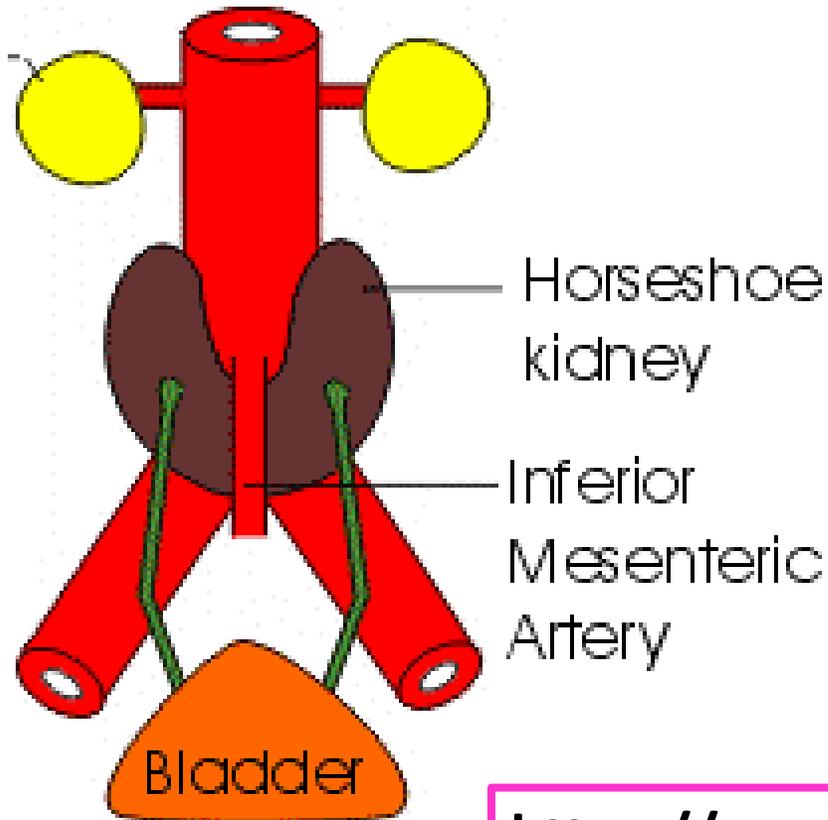
- **Persistence fetal lobulation on external surface**

❖ **Abnormalities of surface**

- **Polycystic kidney:** due to failure of canalization between distal convoluted tubules and collecting tubules.

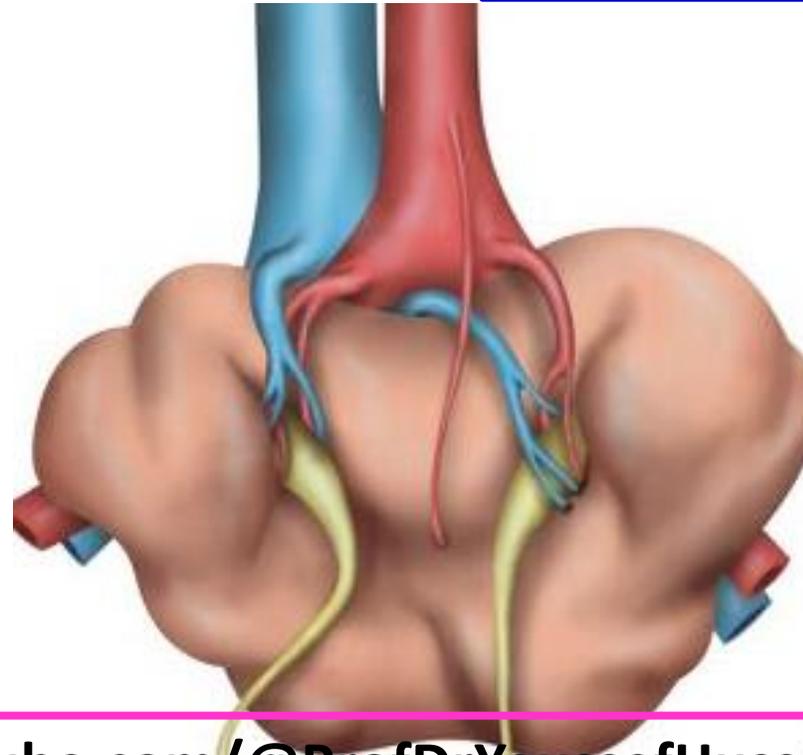


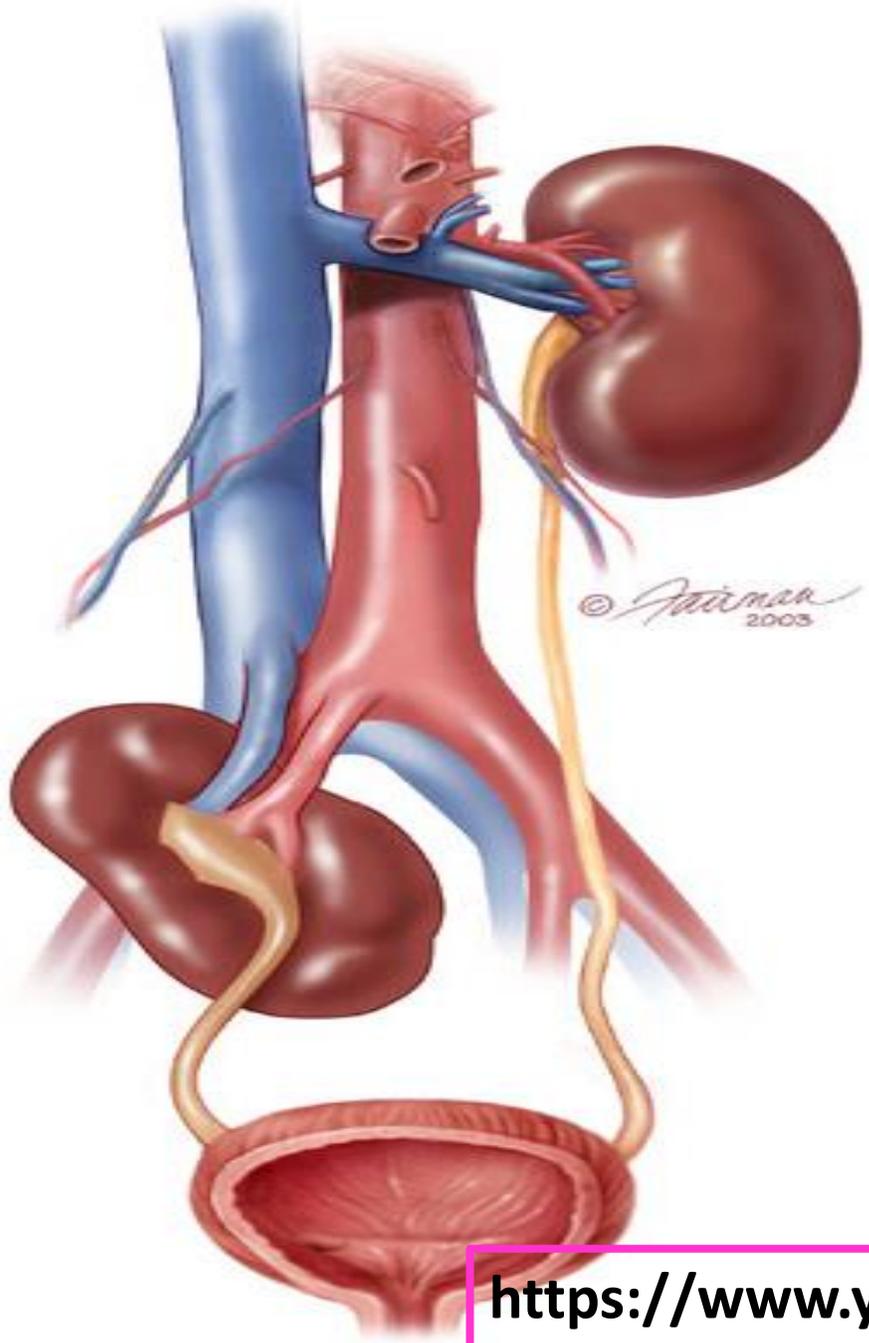
- **Horseshoe kidney** due to fusion of the lower poles of both kidneys.
 - It lies in **lower abdominal cavity** because its ascent is prevented by **inferior mesenteric artery**.



❖ Abnormalities of shape

- **Rosette (cake) shaped kidney:**
 - due to fusion of **both** upper and lower poles of two kidneys.
 - They remain in the **pelvis**.





❖ Abnormalities of the position

- a. **Pelvic kidney:** failure of the ascent of one or both kidneys to their normal positions.
- b. **Incomplete ascent:** it ascends but not reaches its terminal position.
- c. **Ectopic kidney** due to abnormal ascent.
- d. **Mobile (floating) kidney:** Not fixated to posterior abdominal wall. The kidney is movable with changes of body position. This lead to torsion of renal artery or ureter (**Dietl's disease**)

- **Unilateral double kidneys with one ureter.**
 - caused by **complete division** of the **distal end** of the **ureteric bud before contact** to intermediate mesoderm

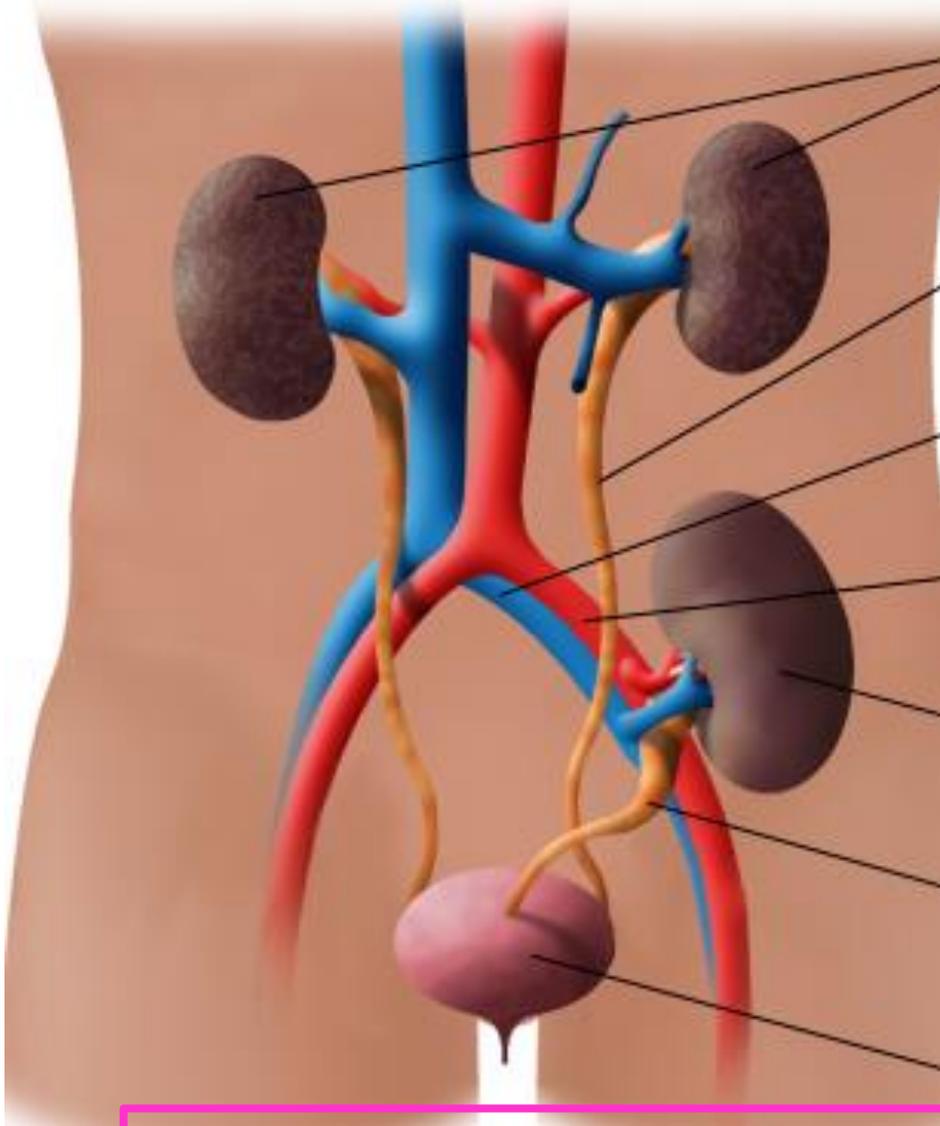


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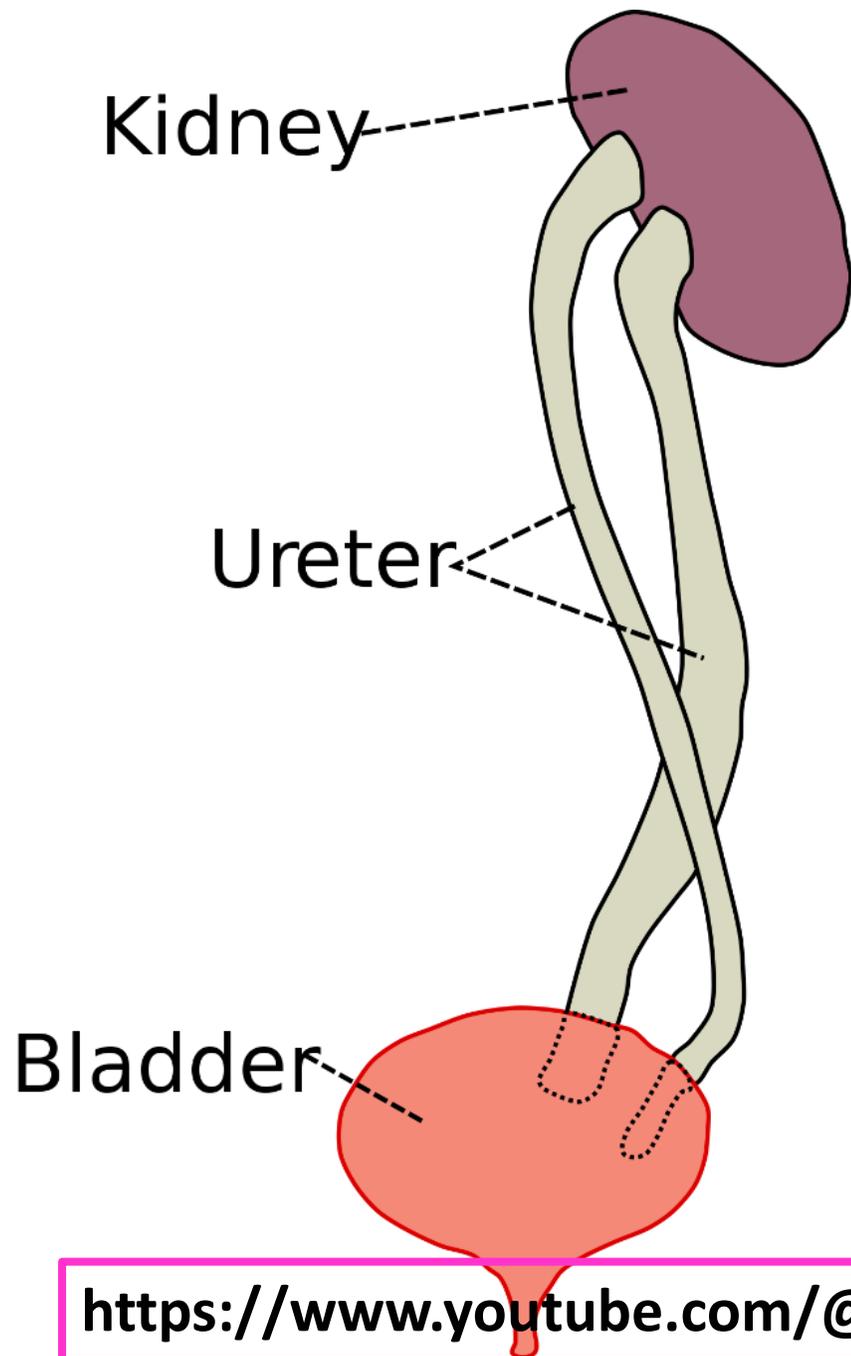


- **Bifid ureter with one kidney:** **complete division** of the **distal end of** ureteric bud **after contact** to intermediate mesoderm
- In such case the renal pelvis is doubled.

- **Unilateral double kidneys and double ureters**
 - due to **early complete division** of ureteric bud **before contact** to intermediate mesoderm

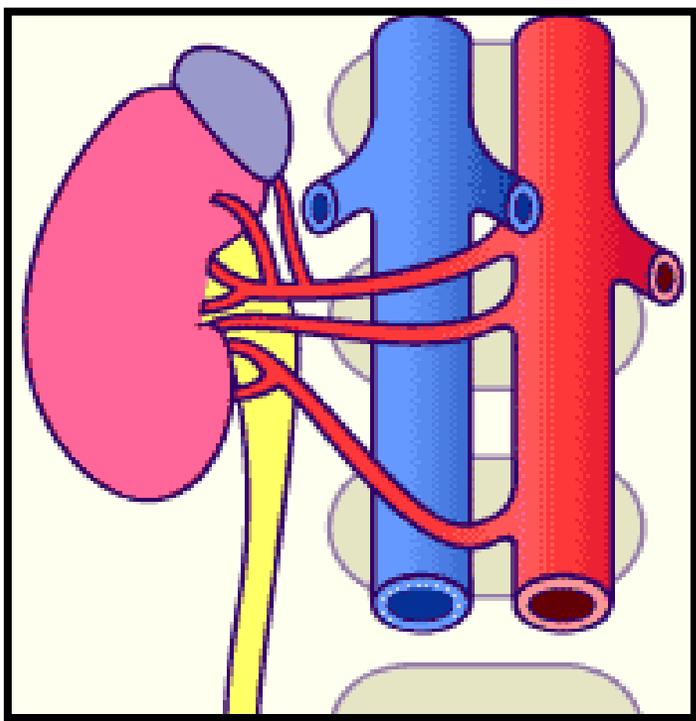


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Double ureters with Single kidney: Complete division of the ureteric bud **after contact** to intermediate mesoderm

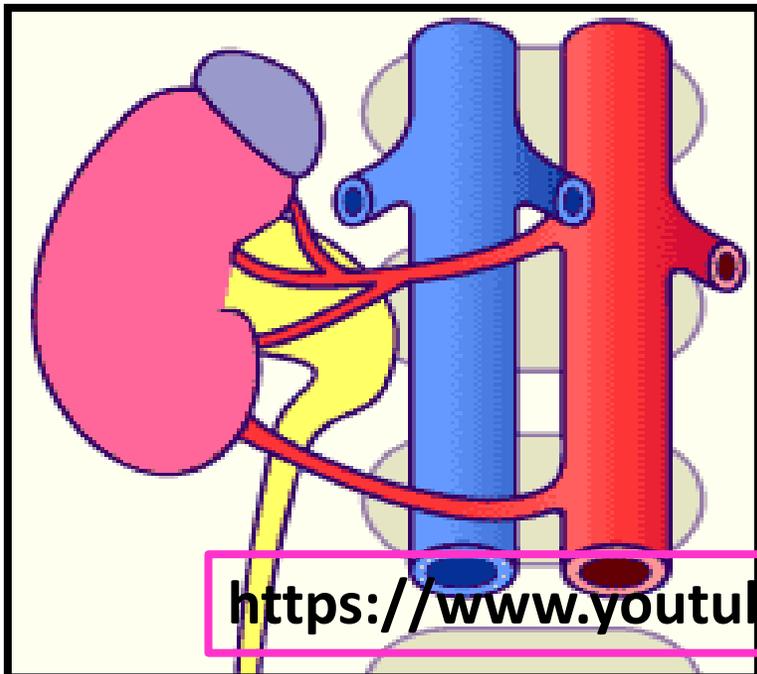
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- **Abnormalities of blood supply:**

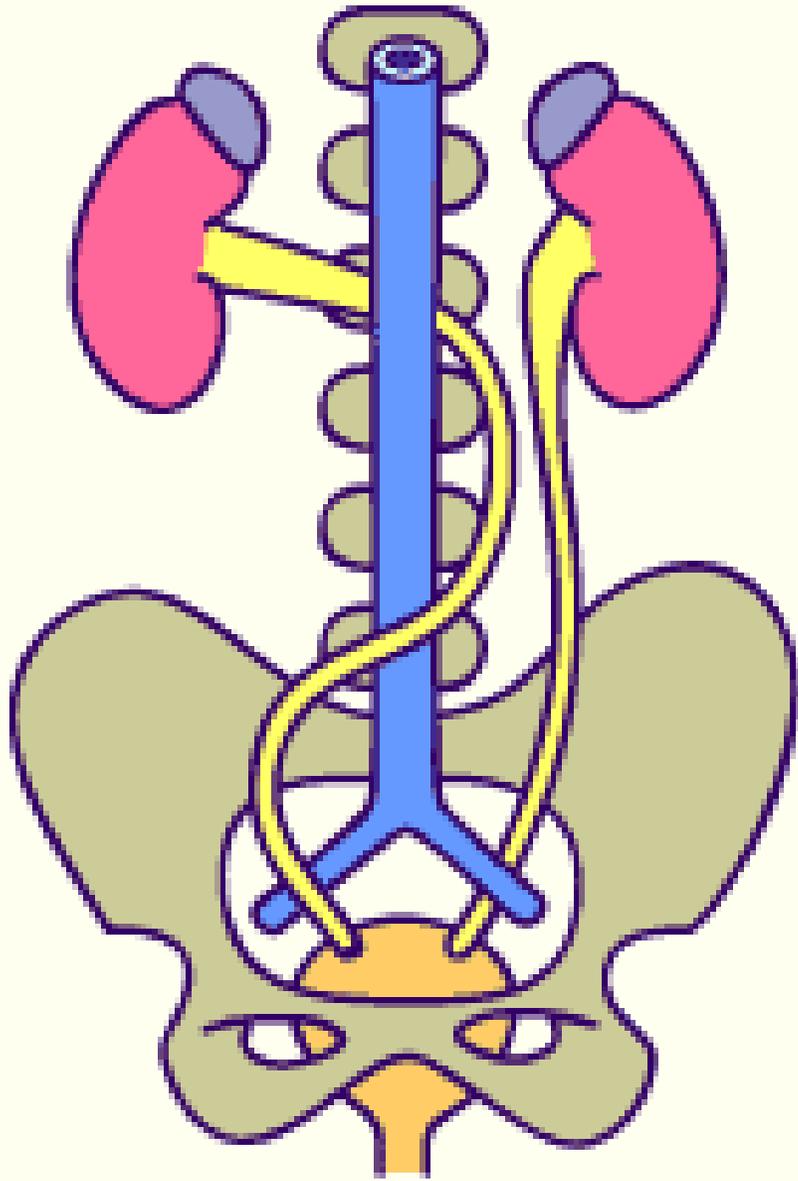
A- Aberrant renal artery: a **persistent** artery during its ascent (enter through hilum).

B- Accessory renal artery: additional artery enters the kidney at its **lower pole**.



- **Lateral rotation of the kidney:**

As a result, the **hilum** is directed **laterally** and the ureter and **renal vessels pass in front of the kidney**.

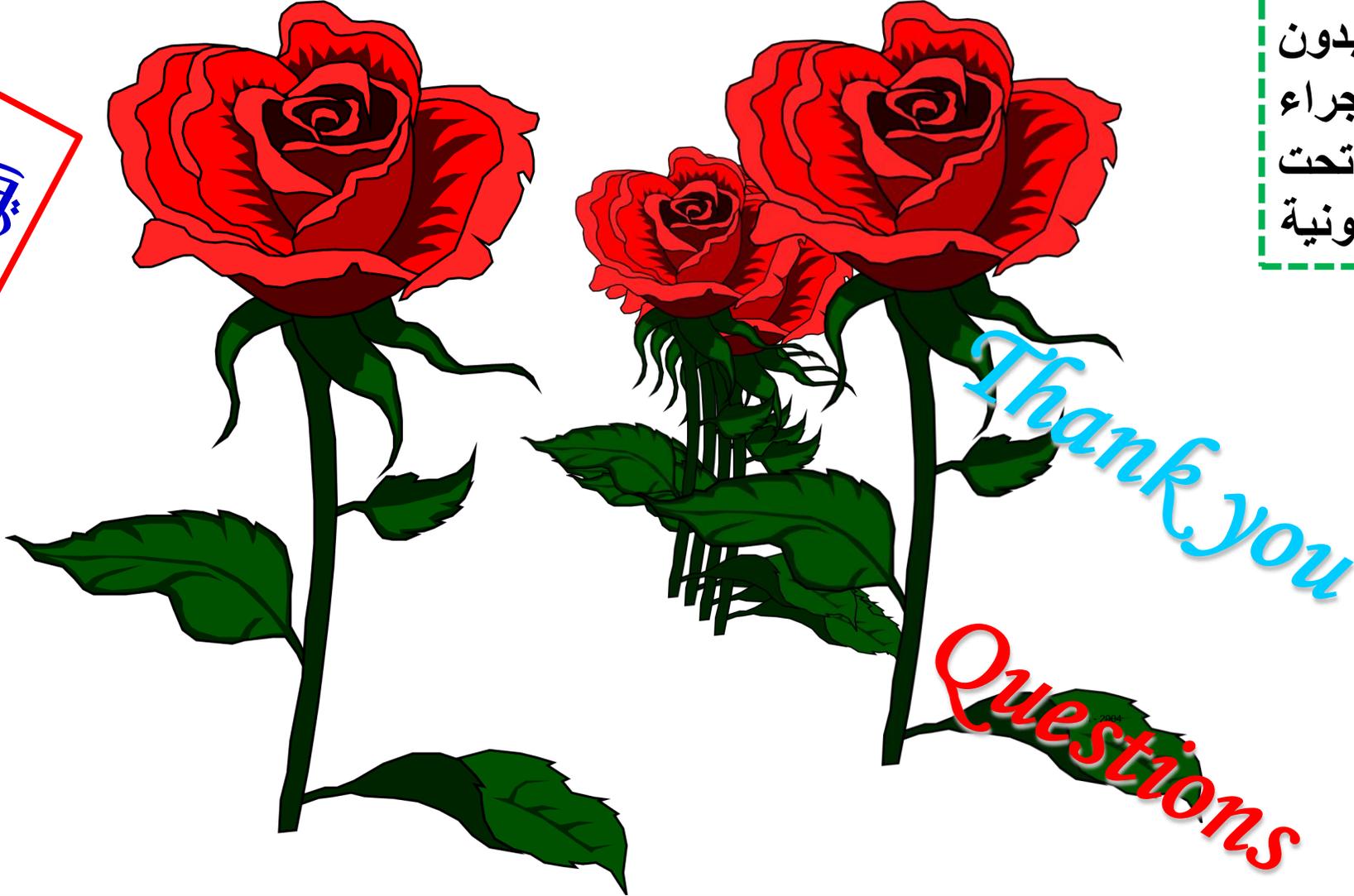


- **Postcaval ureter:** passes behind inferior vena cava leading to obstruction of the ureter.

https://www.youtube.com/channel/UCVSNqbibj9UWYaJdd_cn0PQ

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